

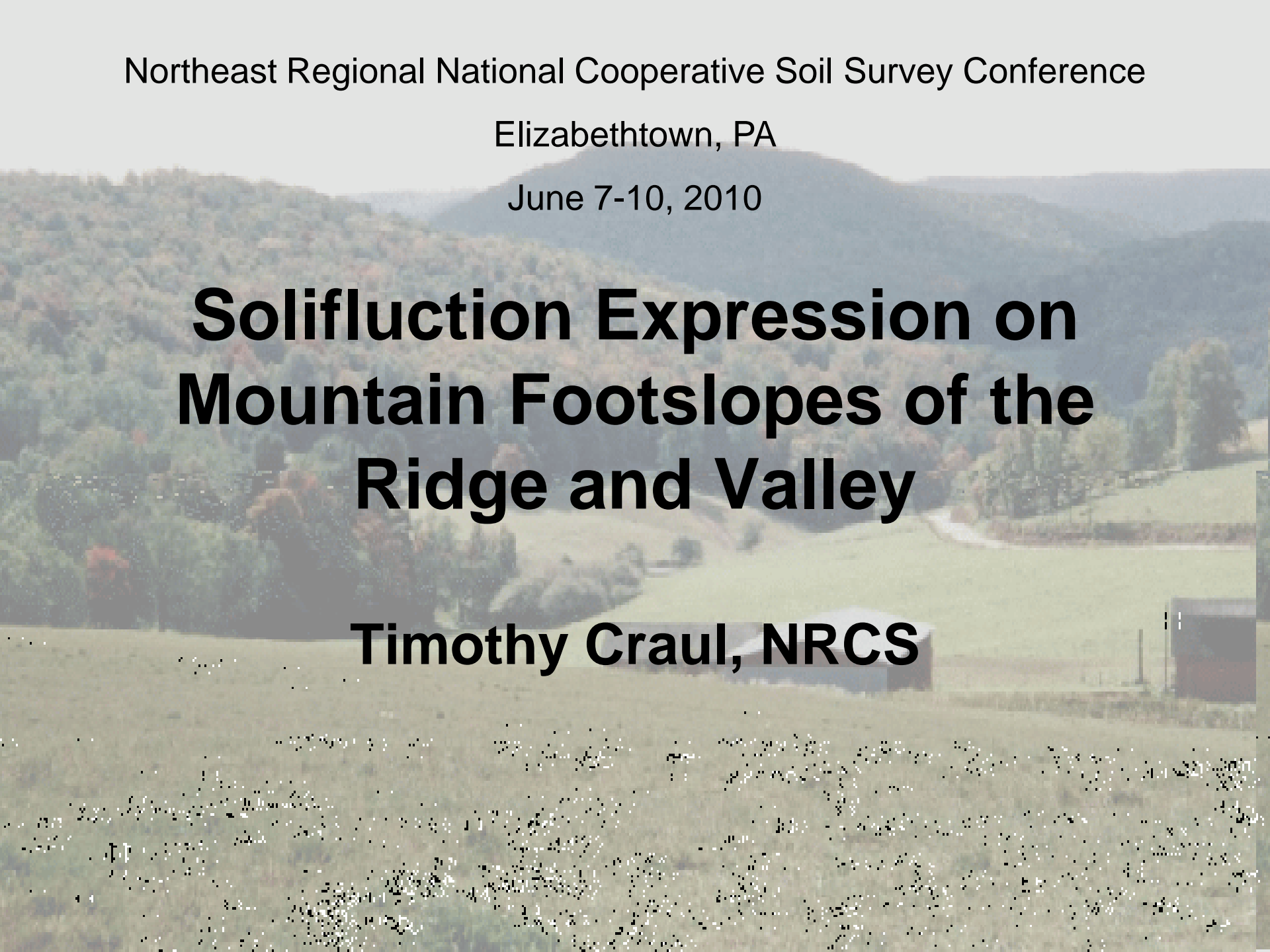
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# **Solifluction Expression on Mountain Foothslopes of the Ridge and Valley**

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# Solifluction

also known as *soil fluction* or *soil creep*, is a type of mass wasting where waterlogged soil slowly moves downslope over impermeable material. It can occur in any climate where the ground is saturated by water, though it is most often found in periglacial environments where the ground is permanently frozen (permafrost). A term often used for deposits formed under periglacial conditions is *Gelifluction*.

<http://encyclopedia.thefreedictionary.com/solifluction>

# Examples of Solifluction



Gros Morne, Newfoundland

Siberia

[http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/periglacial/GSC\\_solifluction\\_lobe\\_Gros\\_Morne\\_small.jpg](http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/periglacial/GSC_solifluction_lobe_Gros_Morne_small.jpg)

[http://www.fettes.com/cairngorms/images/solifluction\\_siberia.jpg](http://www.fettes.com/cairngorms/images/solifluction_siberia.jpg)

# Pennsylvania Example



# **String Lobe Solifluctions are Everywhere**

- **Appear in just about every footslope position below a significant steep ridge**
- **Always in colluvial material**
- **Appear to be better expressed (150 to 300 meters long by 2 to 8 meters high) in loamy-skeletal family classes**
- **Best expression is achieved on slopes between 15 and 35 percent.**



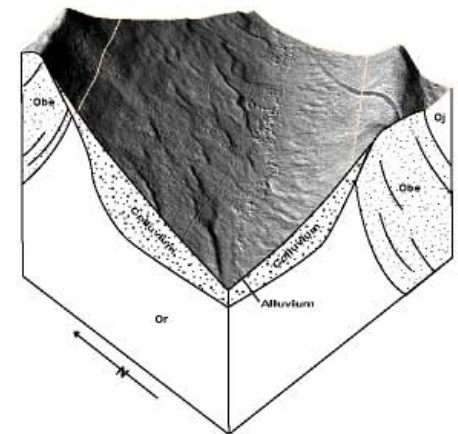
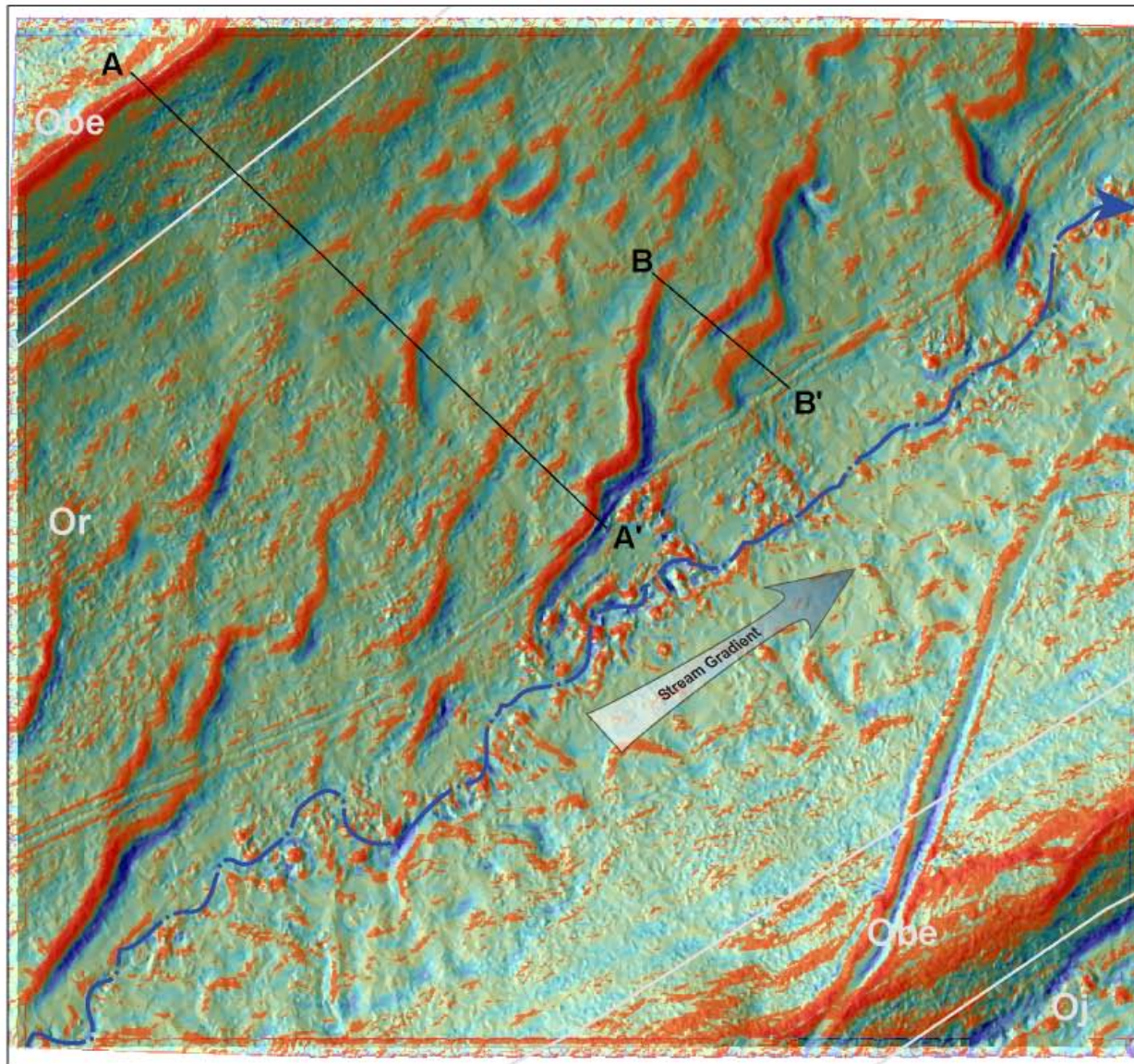








# Solifluctions on Southern Slope of Tussey Mountain, Centre County, Pennsylvania



**Geology**

Oj – Juniata Formation; Sandstone, siltstone, and shale  
Or – Reedsville Formation; Shale, siltstone, and black shale with some sandstone  
Obe – Bald Eagle Formation; Sandstone, siltstone, shale, and some conglomerate

## Legend

Red Edge

profile

Value

Concave: 11.998

Convex: -16.7777



0 100 210 420 630 840 Feet

1:3,815 Scale

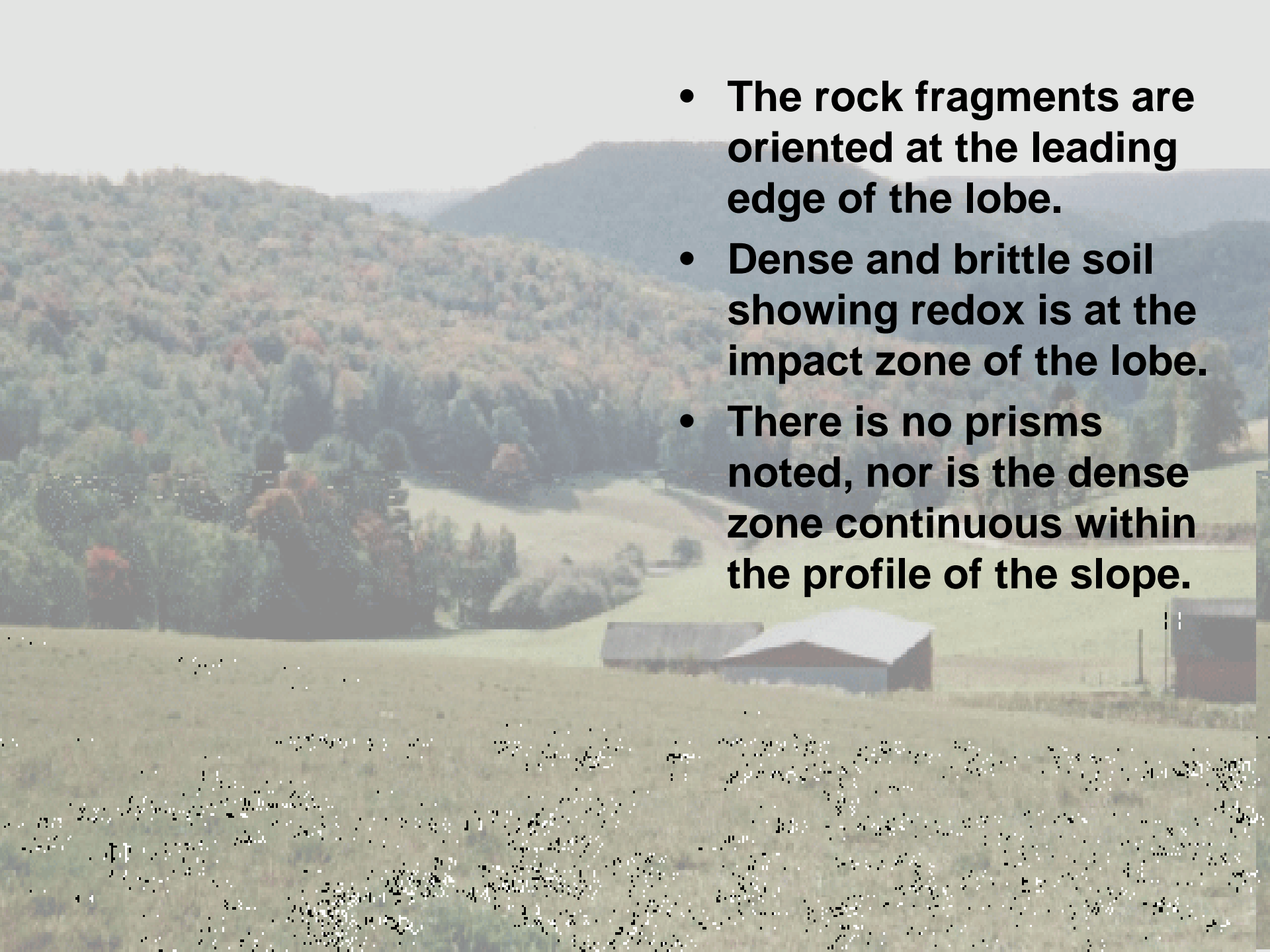
# Solifluction Lobe Shapes

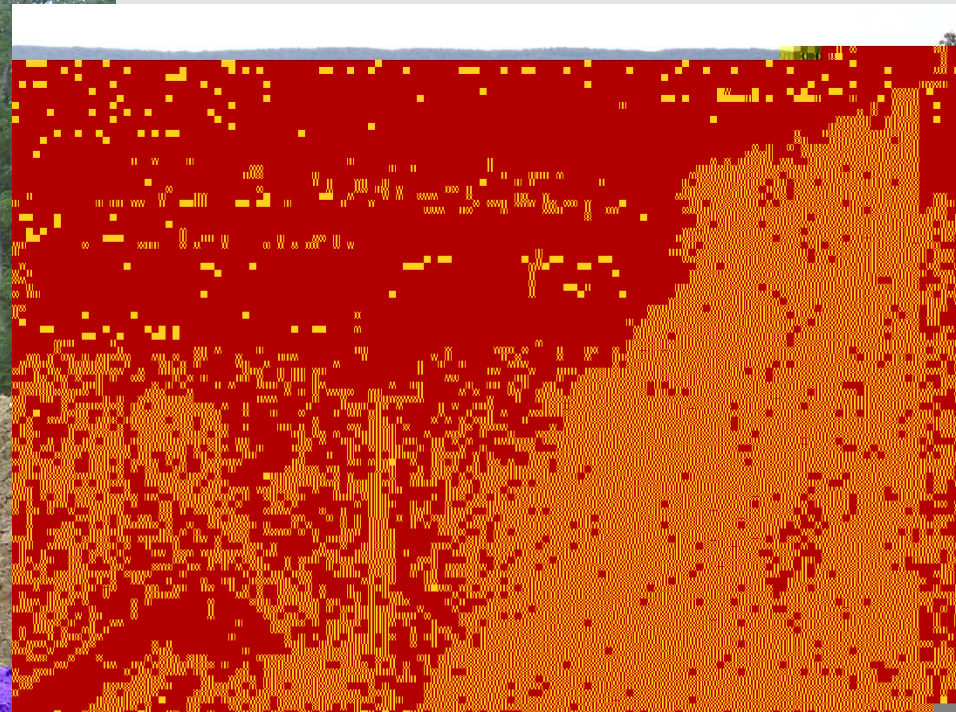
- The leading edges of the lobes are extremely stony
- There appears to be no fragipan development
- There is a wet weather spring at the lowest point of each large string lobe, but not always apparent with the typical crescent shaped lobe.
- Fragipan development improves upslope from the leading edges of both lobes.

# **Lobe Internal Structure**



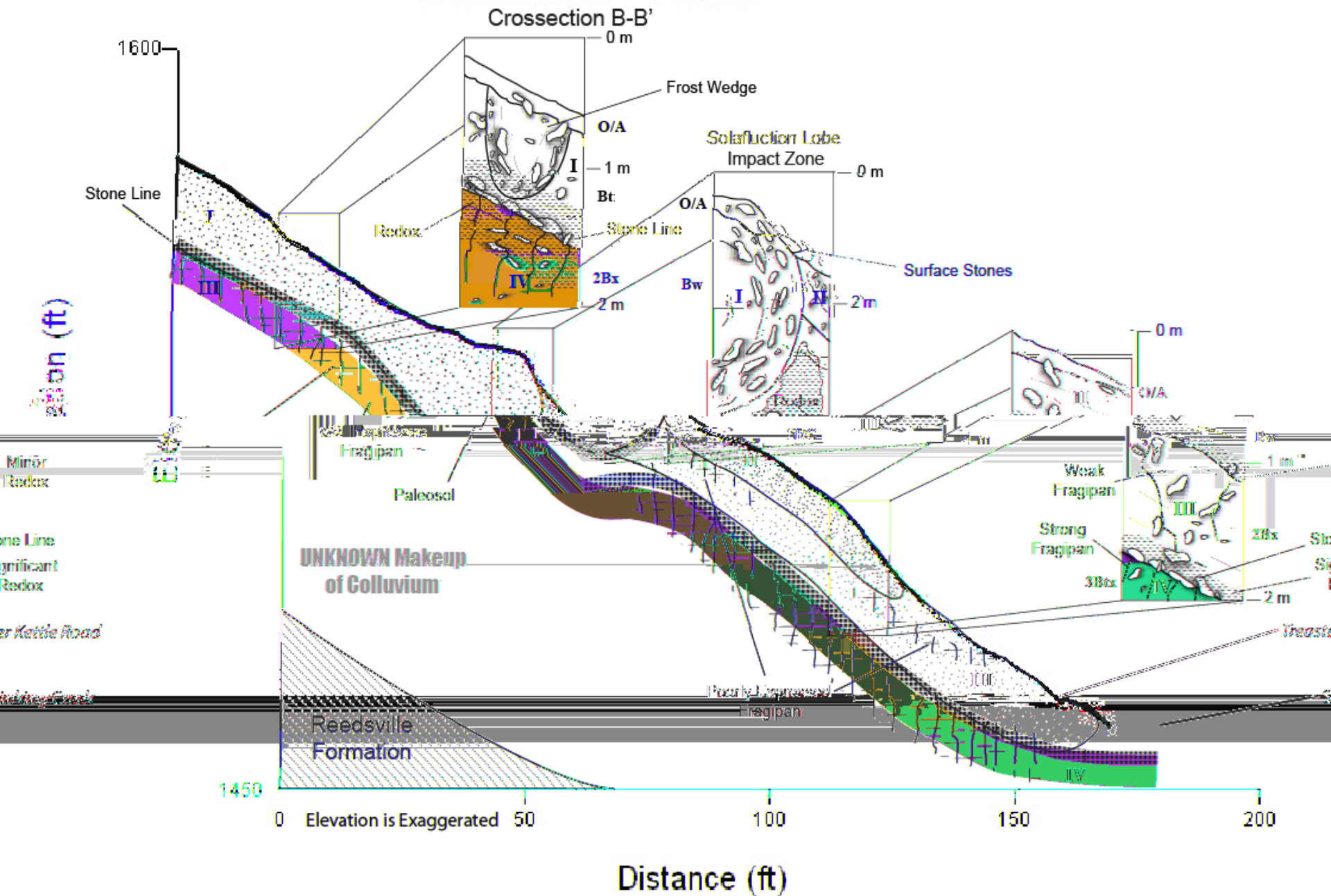


- 
- The rock fragments are oriented at the leading edge of the lobe.
  - Dense and brittle soil showing redox is at the impact zone of the lobe.
  - There is no prisms noted, nor is the dense zone continuous within the profile of the slope.





Crosssection B-B'



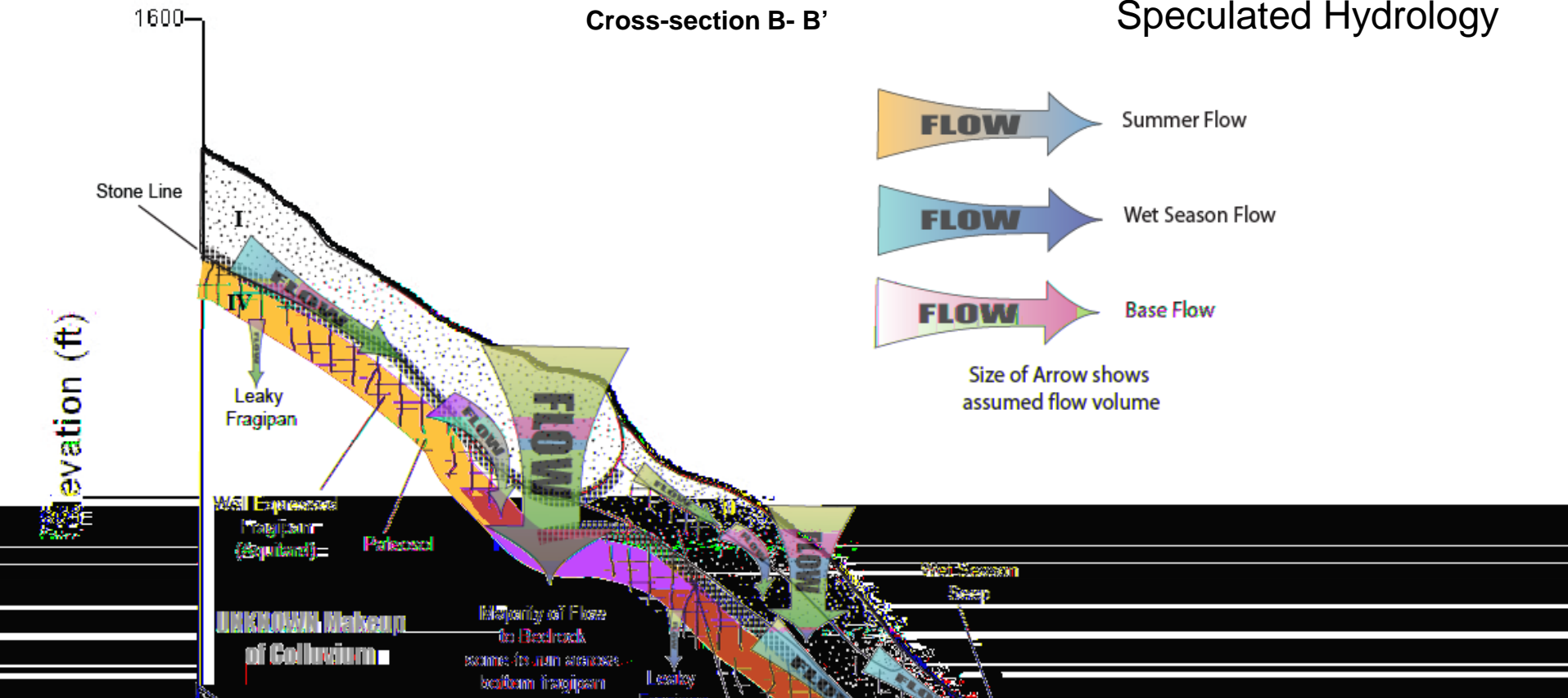




# Solifluction Profile

### Cross-section B- B'

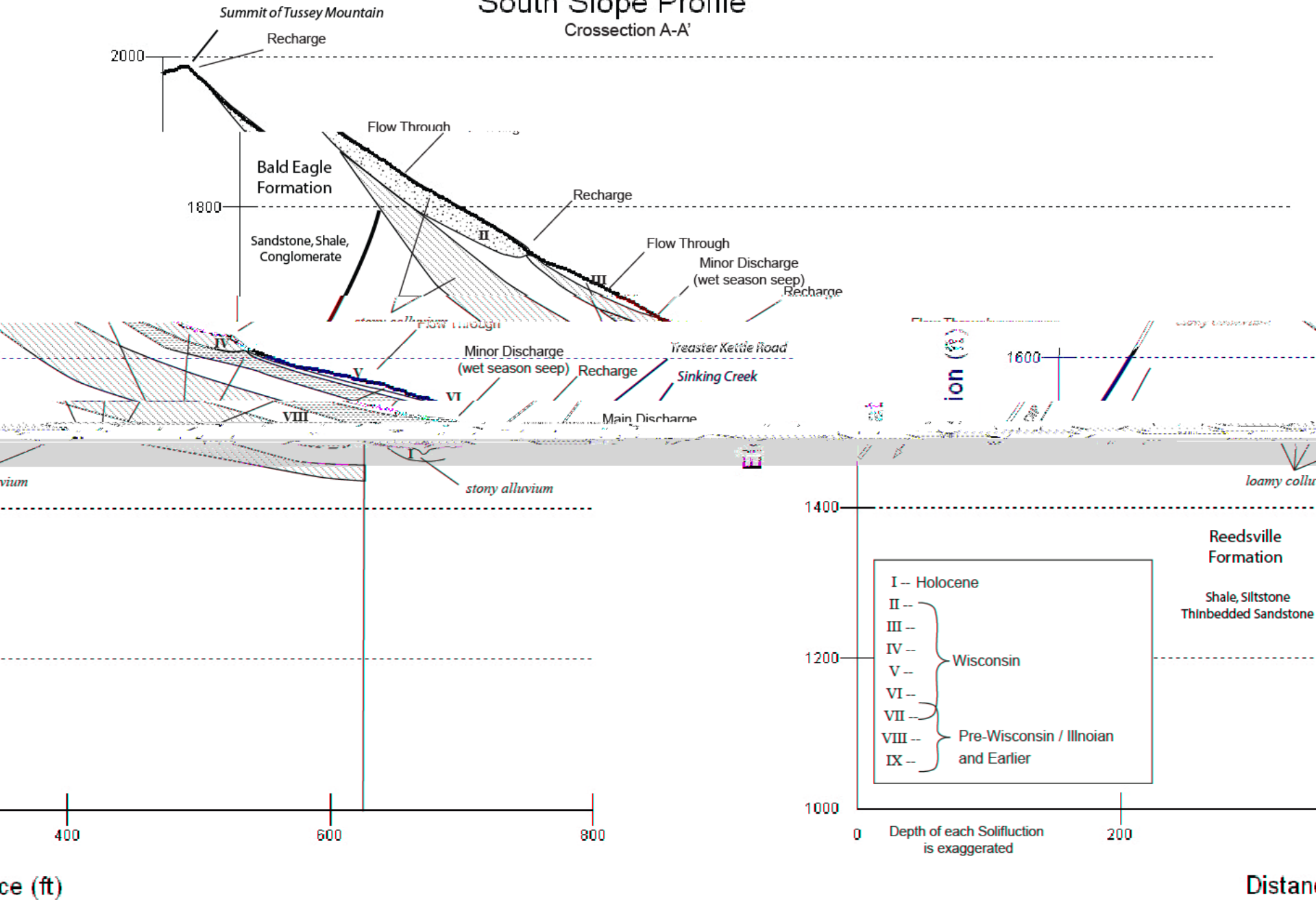
## Speculated Hydrology



# STRATIGRAPHY

## South Slope Profile

Crosssection A-A'



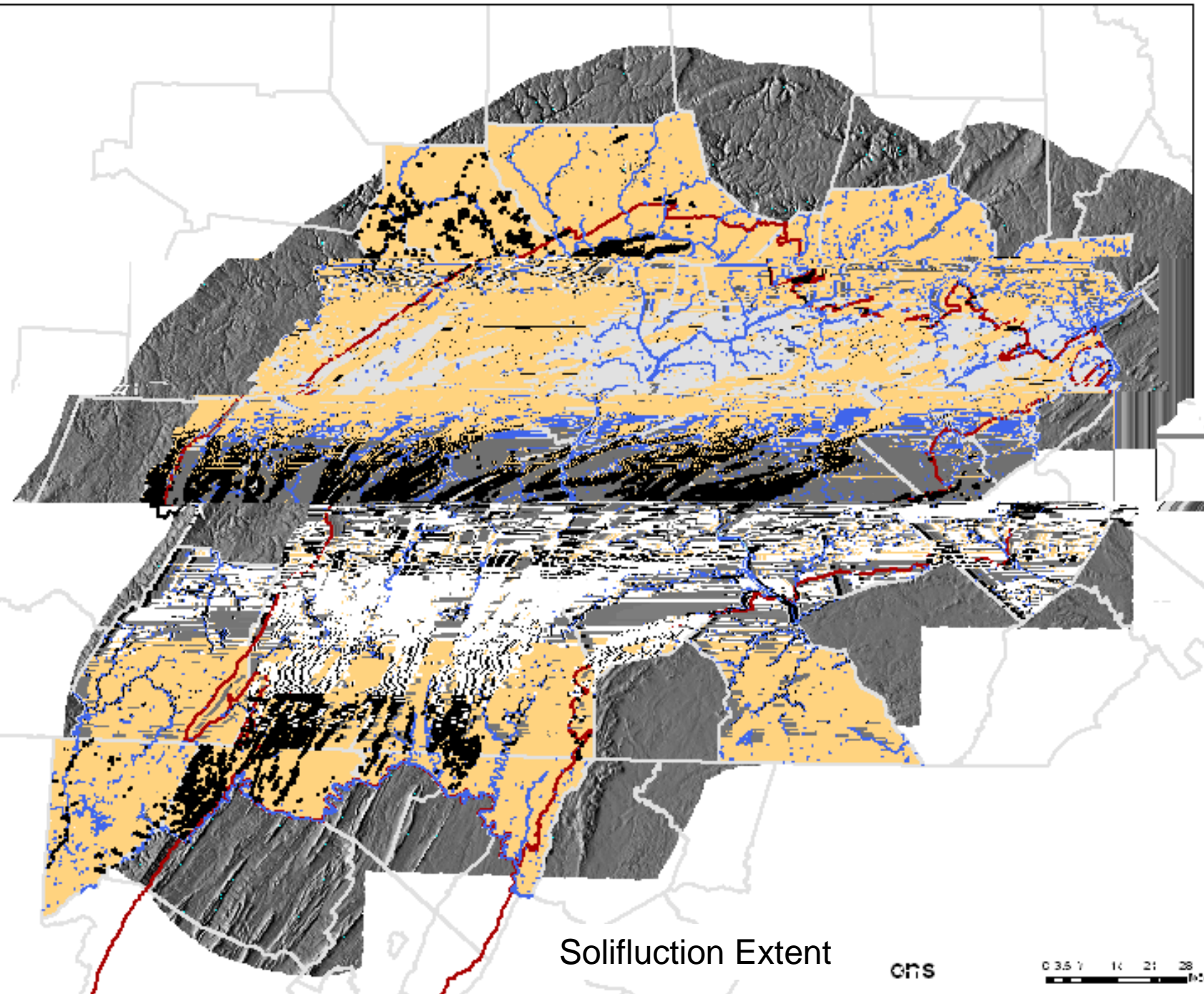
# Facts

- Large String Lobes occur on southern aspect slopes
- Have an orientation of SSW-NNE [about 28° w/ SD 13°] (Marsh, 1998)
- Largest lobes occur in Loamy-skeletal material
- Internal rock fragments appear to be oriented and layered, supporting the theory of mass movement of super-saturated soil.
- Fragipan expression is tied to the internal structure of the solifluction lobe.
- Solifluction structure and stratigraphy seem to dictate internal water flow making the hydrologic functionality of these side slopes more complex than previously thought.
- Historic soil survey mapping is missing these structures.

# Formation Hypothesis

- Due to a significant warming (possibly from the morning sun) the permafrost melted causing super-saturation of the soil material
- The material flowed down slope in a consistency of “Funnel Cake batter”.
- When the leading edge of the lobe encountered resistance, the soil material dewatered quickly causing an increasing buildup of soil.





# What to Do?

- **With increasing availability of LiDAR data, these lobe strings and crescents can be located and mapped.**
- **How do we visualize these features?**
- **It is quite possible that these features are not relegated to the Ridge and Valley and might be anywhere a periglacial climate existed.**